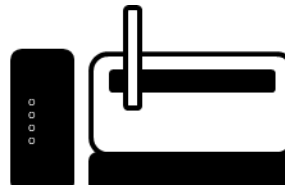
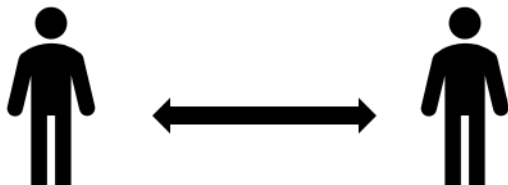


ICP Automation and COVID-19

SDX_{HPLD} for Safer Staff



Key Points

- Reduced staffing due to COVID-19-related social distancing increases the need for automation of preparation in the typical analytical laboratory
- The *SDX_{HPLD}* automates preparative dilution processes on-line as part of the ICP sample introduction process
- The *SDX_{HPLD}* reduces the need for at-the-lab staff time up to 47%, helping manage limited staff situations

Introduction

The impacts of COVID-19 need little introduction since the entire globe has been impacted. Most countries continue to use the strategy of limiting contact between unrelated individuals and this presents a challenge in places of employment, including laboratories. Space is often at a premium in today's lab, and therefore, limiting the number of workers within the lab at any one time can be an important and effective approach to maintain social distancing in the workplace. With fewer attending lab workers, how can samples still be processed efficiently? Laboratory automation devices can play a role to facilitate this.

Integrated ICP Autodilution

Typical ICP workflows can involve the following steps:

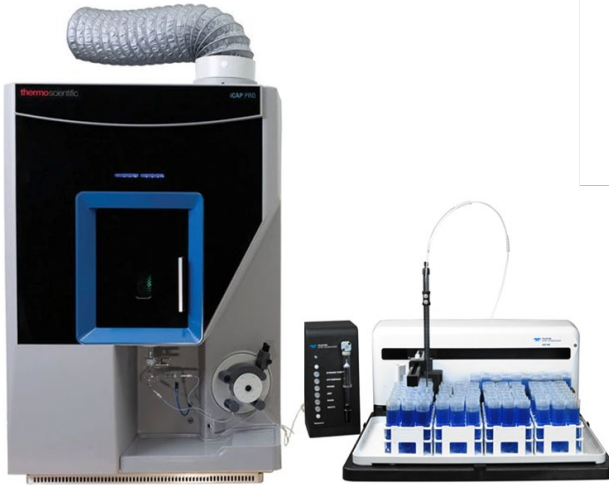
1. Sample reception, logging and sorting
2. Sample preparation, e.g. homogenization and digestion
3. ***Preparation for analysis, including dilution, reagent addition, pouring and racking***
4. ***Preparation and racking of standards and quality controls***
5. Instrument readiness
6. Sample analysis
7. *Results assessment and repeat analysis scheduling*
8. Reporting of results

Steps 3 and 4 can be automated on-line with the ICP instrument using the Teledyne CETAC Technologies *SDX_{HPLD}*. Much of step 7 can also be performed by the *SDX* in concert with the Thermo Scientific[®] Qtegra[™] ISDS software.



On-line Preparation

The SDX High Performance Liquid Dilution (HPLD) system is a syringe pump-based dilution system with an autosampler. It performs dilutions, as needed, into a dedicated vortex vessel on-board the autosampler. This homogenizes the diluted solution immediately prior to analysis, ensuring a well-homogenized and freshly prepared dilution. The key feature of the SDX is its



Thermo Scientific iCAP PRO with Teledyne CETAC SDX_{HPLD}

integration with the ICP software package, enabling it to perform intelligent dilutions as dictated by analytical results in real-time. This means it can take dilution action in cases where a result was over the calibration range, or when internal standards are suppressed or enhanced outside a pre-set range. This is in addition to performing functions such as preparing calibration dilutions or prescriptive dilutions on certain samples. These features lend themselves well to labs that like to simply rack up the samples and leave them to run. The combined system will perform the calibration dilutions, do all the relevant quality control and perform dilutions and repeat analyses as needed, meaning more valid sample results after a single run! It's a little like having an experienced analyst watching the results come off in real-time and taking the necessary actions to ensure validity.

How Much Staff Time at Site Could be Saved?

Example Lab Time Reductions:

Following digestion, processing approximately 200 samples would require:

Step	Manual prep (minutes)	SDX _{HPLD} prep (minutes)
Standard preparation	30	-
Locating samples, pouring and racking	--	54 (includes ~10% reduction for reduced re-runs handled by SDX)
Locating samples, performing dilution, mixing and racking	150	-
ICP start-up and checks	60	60
Wait for initial calibration and QC results	30	30
Total	270	144 (47% reduction)

Conclusion

Automating sample preparation can offer quite dramatic reductions in at-site staff time requirements meaning a safer, more social-distancing friendly workplace in these difficult times. Considering Teledyne CETAC automation solutions could be an investment you can't afford not to make. Contact your representative or cetacsales@teledyne.com for more information or to discuss your lab's individual situation.

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Off-line Preparation

If on-line autodilution doesn't suit your lab's workflow, the SimPrep is a syringe pump-based dilution system with an autosampler and software that can prepare samples by picking up an aliquot from one tube and dispensing with diluent into a second tube. It is also possible to add reagents and prepare standards. The product can be operated in a completely off-line mode, diluting and preparing samples away from the ICP, with the analyst transferring prepared racks of solution to a second autosampler. It can also be used in a sequential mode to firstly prepare samples and secondly introduce them into the ICP for analysis. For this latter mode, the same PC hosts both the dilutor and ICP software packages and it is necessary to switch the communication port between the two software packages, which can be conveniently achieved with a USB switching hub.



Teledyne CETAC SimPrep Off-line Dilution System

